Journal of the American Foundrymen's Association.

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PROCEEDINGS OF THE GERMAN FOUNDRYMEN'S ASSOCIATION

IN CONVENTION, DRESDEN, AUGUST 16, 1901.

From the very interesting proceedings as reported by *Stahl und Eisen,* we take the following: Mr. Scherenberg reported fully on the subject of the new German Tariff, so far as it concerns cast iron. It would seem that the Secretary of the Interior called upon the Association, through its representative, for information relating to the classification of cast iron products, the statistics of production, and conditions of trading. The classification presented had already been adopted officially, and the effect of the tariff was still to be studied. Next came the report on accident insurance as ordered by law. A series of objections had been found well substantiated, but the provisions relating to settlements were working satisfactorily. Concerning the arbitration laws, objections were raised to the method of appointing the board by the contestants, the tendency being to put in men of extreme views, with consequent disruptions. A peculiar feature is the provision which allows the chairman of the board to summon the party of the second part to the conference, under legal penalty, even if the arbitration was sought only by the party of the first part and declined by the other. Market conditions were considered very grave, America having to take her share of the blame with China. Over in Germany they are cursed with a pig iron syndicate which charges what it pleases for pig iron. It seems that the overstocking on the part of nearly all foundries, taken together with the sudden drop in consumption, is bringing a lot of this iron into the market at figures which are far below syndicate prices. This condition shows the precarious state of the foundry business over there. The value of the Foundry-

men's Association is seen from the fact that a commission was appointed to negotiate with the pig iron syndicate concerning a reduction in price and extension of the long time contracts of the members. The terms were to extend the delivery of the iron ordered until Dec. 31, 1902, provided no foreign pig iron was bought, and to divide the loss due to the difference in prices between the time of purchase and the present day (amounting to over seven dollars) between the syndicate and the foundrymen. The membership of the Association is still 304 in spite of the serious condition of business, in fact only the power of the Association in trade matters has kept many concerns in existence. The German Hardwaremen's Association ask the Foundrymen's Association to establish standard lists of stove repair parts, which request was approved of and turned over to a committee. The question of standard specifications for buying coke next came up and created considerable discussion. It seems that of late the foundry coke furnished has deteriorated very much, the percentage of sulphur rising in a very marked manner. There is no definition of what foundry coke really is and should be which could serve as a basis in law suits, and hence a commission is created, which is to study the matter and report specifications for purchasing coke, as well as for taking proper samples. A commission for testing cast iron and drawing up specifications was also asked for and adopted. The members of this committee which is to take up the work of testing cast iron, in a similar manner as our own investigations, consist of Privy Councillor Juengst, Gen. Manager Heckmann, Prof. Wuest and Mr. Robert Jolly. Papers on the Baby Bessemer process and gas firing for drying ovens were presented, and the convention adjourned to meet next time in Duesseldorf.

PROCEEDINGS OF THE PITTSBURG FOUNDRYMEN'S ASSOCIATION.

Oct. 7th, 1901. *The Iron Trade Review.* At the regular monthly meeting, officers for the ensuing year were elected as follows:

President, John McClaren, of Phillips & McClaren.

Vice President, T. P. Thomas, of Sterrit-Thomas Foundry Co.

Treasurer, Philip Mathes, of Brittain & Mathes Co.

Secretary, F. H. Zimmers, of Union Foundry & Machine Co.

Executive Committee: Wm. Yeagle, of Wm. Yeagle & Co., Limited; S. D. Sleeth, of Westinghouse Air Brake Co.; Robert Taylor, of Taylor, Wilson & Co.; Davis Evans, of Pennsylvania Casting & Machine Co.; S. H. Stupakoff, of Vulcan Mfg. Co.

The retiring officers were tendered a vote of thanks and President McClaren assumed the chair. The business before the meeting, which consisted of changing the time of meeting to the first Monday in the month, was quickly disposed of.

Mr. S. H. Stupakoff of the Vulcan Mfg. Co. of Pittsburg then read a paper on "The Molding Machine," which was merely an introductory to a number of additional papers on this subject which will follow. Mr. Stupakoff intends to make an exhaustive study of molding machines and the result of his researches will be given to the American Foundrymen's Association from time to time. That the subject will be thoroughly covered is well known to all those associated with the American Association and Mr. Stupakoff will gladly receive any assistance or suggestions which will aid him in his task.

After the meeting adjourned a lunch was served.

PROCEEDINGS OF THE FOUNDRYMEN'S ASSOCIATION OF PHILADELPHIA.

Sept. 4, 1901. *The Iron Age.* President Thos. I. Rankin in the chair. The report of the treasurer showed a balance of $2000 in the treasury, with all indebtedness paid.

The application for membership of the Downington Mfg. Company, East Downington, Pa., was presented, and on motion the secretary was instructed to cast a favorable ballot.

Under new business the papers before the association for the evening were presented, and consisted of one on "The Tropenas Converter Steel Process," by A. Tropenas, Paris, France, copies of which were distributed among those present, and a paper on "Machine Cast Pig Iron," by Albert Ladd Colby, metallurgical engineer of the Bethlehem Steel Company, South Bethlehem, Pa.

A short discussion of Mr. Colby's paper followed, in which, in answer to a question from Mr. Davis whether there is any material change in the grain of machine cast general foundry iron, with manganese at 0.3 and at 0.8 per cent, Mr. Colby stated that

that variation in manganese should not have a very marked effect as regards the fracture, but it would be safer to determine definitely in all cases by chemical analysis. Mr. Flagg asked whether the jarring of the mold in casting machine cast pig iron does not interfere with the grain of the iron. Mr. Colby admitted that it does, if the jarring occurs before the iron reaches the point of solidification.

Edgar S. Cook, Warwick Iron & Steel Company, said that his company had adopted the practice of machine casting after careful inquiry and study. He read a number of letters from foundrymen in support of the good working qualities of the machine cast pig iron manufactured by them. Mr. Cook said that with uniform ores and uniform manipulation the grain of the iron could be maintained to some extent. In their practice the iron, after pouring in the molds, was left several minutes before being watered, and he showed several samples of machine cast pig which would approximate 3 per cent. silicon, 0.02 per cent. sulphur and manganese under 0.5 per cent., and which did not show any chill effect on the edges.

Thos. I. Rankin insisted that every furnaceman manufacturing machine cast pig iron could overcome the objections of the foundrymen to the same by an honest shipment of iron—suitable just for the particular work it was being bought for—and further said that in his opinion the time was not far distant when machine cast iron would be generally used. After a vote of thanks to Mr. Colby for his able paper the meeting adjourned.

Luncheon followed on the roof garden of the club. President Thos. I. Rankin acted in his usual happy manner as toastmaster, and called upon Messrs. P. D. Wanner, A. L. Colby, E. S. Cook, A. Williams and others in turn, each of whom responded in an interesting manner.

October 2, 1901. *The Iron Age.*

After calling the meeting to order the minutes of the previous meeting were disposed of in the usual manner, and the ordinary routine business transacted. Under new business the Executive Committee reported on the matter of incorporation for the association, and after discussion it was moved by P. D. Wanner that "The Executive Committee be empowered to proceed

Error on page 105.

was twice the minor axis. This deformation produced no signs of fracture in either case.

The physical properties of the steel, as determined on two turned specimens, cut from the finished and treated forging, one the Standard U. S. Navy specimen of .500 inches diameter and 2 inches gauged length, and the other the Standard U. S. Army specimen of .564 inches diameter and 4 inches gauged length, are as follows:

with the matter, and take necessary steps for the incorporation of the association under the name of the Foundrymen's Association of Philadelphia, Pa." This motion was seconded, and on vote of members, was carried. Further new business consisted of the nomination of officers of the association for the year 1901-1902, and on motion of Thomas Devlin, which was duly seconded the present officers were all named for nomination to succeed themselves. The nominations are as follows:

President, Thomas I. Rankin, Abram Cox Stove Company, Philadelphia.

Vice President, James S. Sterling, Harlan & Hollingsworth Company, Wilmington, Del.

Treasurer, Josiah Thompson, J. Thompson & Co., Philadelphia.

Secretary, Howard Evans, J. W. Paxson Company, Philadelphia.

Executive Committee—Antonio C. Pessano, chairman, Geo. V. Cresson Company, Philadelphia; Stanley G. Flagg, Jr., Stanley G. Flagg & Co., Philadelphia; E. E. Brown, E. E. Brown & Co., Philadelphia; Jno. Glover, Glover Bros., Philadelphia; William Hanson, Pennsylvania Iron Works Company, Philadelphia.

Ballots will be cast at the next meeting, November 6, 1901, it being the annual meeting of the association.

The association then proceeded with the papers for the evening, and Geo. H. Wadsworth of Kent, Ohio, was introduced, and read a paper on the Wadsworth & Sherwin hand power core machine.

The core machine, as well as its various attachments for different sized cores, and green and dried cores of different sizes and length, were on exhibition; after the reading of the paper Mr. Wadsworth demonstrated the operation of the machine by the manufacture of cores of various sizes, rapidity of change in making attachments on the machine, etc. Considerable individual interest was taken by the members present, and the various details and possibilities of the machine were carefully examined, at the conclusion of which a unanimous vote of thanks was tendered Mr. Wadsworth for his interesting paper and demonstration.

The meeting then adjourned, and those present proceeded to the roof garden of the club, where luncheon was served.

November 14. The eighth annual meeting of the association was held on Wednesday, November 6, Thomas I. Rankin, president, occupying the chair. A large attendance could be chronicled. The Executive Committee reported progress in the matter of incorporation of the association. The treasurer reported a balance of $1,775.93 in the treasury, with all indebtedness paid. On motion of Thomas Devlin, Mr. P. D. Wanner cast the vote for officers by unanimous consent. The following officers were then declared elected:

President, Thomas I. Rankin, Abram Cox Stove Co., Philadelphia, Pa.

Vice President, James S. Stirling, Harlan & Hollingsworth Co., Wilmington, Del.

Treasurer, Josiah Thompson, J. Thompson & Co., Philadelphia, Pa.

Secretary, Howard Evans, J. W. Paxson Company, Philadelphia, Pa.

Executive Committee: Antonio C. Pessano, chairman, Geo. V. Cresson Co., Philadelphia, Pa.; Stanley G. Flagg, Jr., Stanley G. Flagg & Co., Philadelphia, Pa.; E. E. Brown, E. E. Brown & Co., Philadelphia, Pa.; John Glover, Glover Bros., Philadelphia, Pa.; Wm. Hanson, Pennsylvania Iron Works Co., Philadelphia, Pa.

Mr. Thomas Devlin then moved that the Philadelphia Association join other manufacturers and associations in sending a committee to the National Reciprocity Convention to be held in Washington, D. C., on November 19th. Mr. Wanner amended the motion as follows: "That it is the sense of this association that reciprocity is the best policy of this government for the furtherance of the interests and welfare of the country." Motion as amended carried. Mr. H. M. Baldwin, manager of the Foundry Department of the Power Specialty Co., then read a paper on the "Bryan Vacuum Molding Machine," and after some discussion a paper by Wm. D. Allen, of Huntsville, Ala., was presented and read by Mr. Howard Evans. A vote of thanks was tendered for each of the papers, and the meeting adjourned.

DISCUSSION OF MR. S. H. STUPAKOFF'S PAPER ON "THE MOLDING MACHINE.".

American Manufacturer, Oct. 10. Mr. Stupakoff claims that the introduction of machinery lightens labor and increases the revenue for all concerned as well as reducing the cost of the article. Taking the molder as an example, his work for centuries has been dirty and the appearance of the molder unkempt. In the shops where machinery has been introduced to do much of the work a cleanlier set of men can be found. They wear better clothes. Doing this their ambitions have been fired and they live better. They can produce more work and if they do not receive more money it is because the system has not been universally adopted among foundrymen, and the up-to-date molder is like the scholar in the class room held back by a few stupid pupils.

The molder who does not have his sand mixed for him when he comes to work, who has to stoop over a pile of scrap and dirt to cleanse the same before beginning his day's work cannot be as accurate and careful nor use his brain to the same advantage as the other molder who has his work done for him by machinery and starts his day's work without being fatigued by drudgery. This subject has been discussed in meetings of foundrymen; it has been agreed to by all manufacturers that the less drudgery the workman has to do the more active his brain. Yet manufacturers are slow in adopting systems they admit will prove remunerative, and none more so than foundrymen.

DISCUSSION ON MR. JOHN G. SADLIER'S PAPER ON "THE PROBLEM OF THE MOULDER."

The Foundry, August. Mr. F. B. Shaffer, of Elizabeth, N. J., writes the following:

Are skilled workmen really scarce, and if so, why? Can this condition be attributed to the decline of the apprentice system? Personally I think not, because the apprentice system has not been abandoned nor is it on the decline. There never was a time when more boys were employed at learning trades than today. There are more shops than ever, and if some shops

have to a certain extent abandoned all system of training their apprentices, others have made up for them.

That there is a scarcity of skilled workmen I will not gainsay, but I doubt very much if these were ever more plentiful. I believe indeed, that a skilled workman of 25 or 50 years ago would make a very poor showing alongside our star workmen of today. Let us take our own trade, molding, for example, and are there not castings made today in green sand that our fathers would not have dreamed of attempting to make any other way than in dry sand or in loam? These are of immense magnitude; perfect and grand to behold.

There always were and always will be botches in any trade and calling. I confess the word "botch" does not look nice on paper, but there is no expression that can better designate a careless, slovenly, stupid mechanic. If there are so many inferior men, who are to blame and who are responsible for this state of affairs? I assert fearlessly, the employers themselves. This may seem almost incredible, but it is nevertheless a fact.

In many sections of this beautiful country of ours there are shops which are filled with nothing but apprentices. Every year these send into the labor market a lot of so-called mechanics possessing such poor abilities that if the shops in which they learned the trade have an important job on hand, an outsider must be engaged to do it, as they could not possibly trust one of their own graduates with the same.

The trouble with many a shop is this: They take on boys ostensibly to teach them a trade, but instead of doing so have put them on one machine or keep them doing one class of work, until their time has expired, where no opportunity at all is offered them to acquire a knowledge of the technical points of the trade at which they are working. This is the main reason why so many inferior men may be found in a trade. The question arises, how can this be remedied, and by whom? How can we become a nation of first class mechanics? The remedy is very simple, and the employer is the doctor.

When a boy is taken as an apprentice he should be given a fair trial of say three months. The foreman or the employer, if they be observing men, will soon see what is in that boy. If he shows a disposition to take more interest in prize fights, foot

races, base ball or in ten cent novels, if he will yawn and stretch when the bell rings to start to work, if he will be found outside the shop with his coat half on before the third tap of the bell at quitting time, if he is in the habit of running around the shop half an hour at a time hunting something he has not lost or does not want, if he comes into the shop in the morning with blood-shot eyes showing the effects of debauch, the sooner that boy is dismissed the better it will be for any trade. His only ambition is to watch the clock, and wait for quitting time to come around. These are the boys who worry in their three or four years, and nominally they are mechanics, but practically they are only "botchers," and can never be trusted with a piece of work that is particular or wanted in a hurry.

It is said that the veteran showman, Dan Rice, had a goose he tried to train, but the more he labored with the goose the less the goose knew, and so it is with some boys and to attempt to retain these boys is a waste of time and expense. Keeping such material is what fills the market with inferior mechanics, who are dear at any price. They are better qualified to run a wheelbarrow and pick and shovel than to work at anything that requires judgment and skill.

I will relate another instance which shows what helps to turn out inferior mechanics. I know a large manufacturing company which does an extensive business. All of their departments are filled with apprentices who get nothing but the plainest kind of work. Annually there is a lot taken in and another lot pushed out, the latter not being in any sense of the word mechanics, but young men who were led to believe that if they served A. B. & Co. so many years they would learn the trade they desired. After serving their time at wages scarcely sufficient to clothe them, they find to their sorrow that they have not sufficient knowledge of the trade to enable them to go into any other shop and demand a journeyman's wages. Instead of changing these boys from one job to another they are kept on one or two jobs, and how can it be expected to have the market filled with experienced men when our manufacturers persist in teaching trades after this manner? It may pay the employer in a pecuniary way, but to say the least it is an injustice to the boy.

The best way to elevate any trade and to have it composed

of men who will be an honor thereto is for the employers to carefully examine those they intend to employ as apprentices, securing intelligent, hardy, sober, honest, industrious and ambitious boys, qualified in every way to become a valuable acquisition to the shop and trade.

The employer should be prepared to furnish the apprentice with such a class of work as will compel him to use his thinking powers, and also stimulate his ambition. As soon as he is able to do a certain class of work speedily and accurately, then he should have a change, and this policy should be kept up until by the time he has served his four years he will be a credit to himself and the trade.

The employer should insist on having apprentices serve 300 days a year, failing in which they should be compelled to put in the days they have been absent at the end of the regular term. This would be an incentive to the boy to stick to the shop and hasten through his time instead of playing off sick or being absent through one excuse or another. As a general rule I think the foreman does not pay enough attention to the boys in the shop. As long as he plods along on plow points and flanges and does not kick the foreman seems to be satisfied to let him go along in his own way. The boys we accept as apprentices should be looked after and carefully instructed, their treatment should be courteous, and while these things will take a little time, it will pay a man, and there will then be less need to cry that skilled labor is scarce. I make the assertion that the more good mechanics we make at home the less we will have to import, and the sooner we make more of our own the less trouble there will be between labor unions and employers.

In *The Foundry* for September, Mr. O. I. Rice, of Indianapolis, writes from his own experience, on Mr. Sedlier's paper:

While he says that the molders are degenerating and that this individual is partially himself to blame, he also acknowledges that the shop proprietor has not done his full duty in teaching apprentices, but has instead tried to keep them on one class of work as much as possible. Then he reprimands such molders for going out and calling themselves molders. This is the proprietor's side of the story, and I am going to state the molder's.

It is all well enough to keep a boy on one piece of work until

he has learned to do it well. Then he should have another piece a little more difficult than the last one, and so on until he has served his time. In this way he will be able to go out into the world and to be able to lay some claim to being a molder.

I do not believe that a boy should be advanced too fast, for many a good boy has been spoiled by shoving him ahead too rapidly. We can, of course, not expect a boy to learn his trade on stove plate or in a car shop and be a good machinery molder, or vice versa.

Mr. Sadlier's remark that a journeyman should not stand in the way of an apprentice is advice which hardly need be given, because no one is more desirous of seeing the apprentice become a good mechanic than the molder himself, for a good molder realizes that a poor one is a detriment to his best interests. The reason in many instances why the molder refuses to teach the apprentices is because the firm makes a practice of filling the shop with boys and then trusting to the journeymen molders to teach them, and just as soon as they learn to do the work of the latter, the man is let go and the boy retained in his place. In this general howl for better mechanics, the firms who employ the greatest number of apprentices and turn out the largest number of poor mechanics are the loudest shouters. Sifting the whole thing to the bottom, it is not a question of good mechanics with them. The pointed issue is to save a few dollars on a week's work. Their hoggish nature will only allow them to see one side of the question.

Some foundrymen say that the apprentice ratio of the Iron Molders' Union, which is at present one to eight and one for the shop, is not enough. If this were made one to one, there would still be kickers.

When the time comes when the foundryman will himself take some interest in the boy who enters his shop, then will the time come when the molder will take special interest in advancing the apprentices towards becoming good mechanics. As long as the foundrymen persist in looking at this question from a selfish point of view, just so long will the troubles of which we now hear complaint remain with us.

The same journal also gives the editor's opinion on the sub-

out the greatest number of pounds of castings at the least cost is the man who will do the work of our foundries, no matter how much hot air is wasted in explaining the so-called "degeneracy" of the molder.

This subject has furnished a lot of ammunition at foundrymen's meetings and left a hazy smoke to befog the conditions as they are. Some of the very people who shout the loudest for highly educated molders have their shops filled with Hungarians who can't write their own name, but can make castings. After all castings are what the foundryman wants, and he cares not whether Jew or Gentile makes them.

In the foundries of today we are not looking for the ideal. We want that which is practical and commercially profitable. We saw some large water pipe in the street the other day which were decorated with scabs of more or less prominence, but these castings had passed the test, they would carry the pressure required and no board of works commissioners would have paid fifteen cents a ton extra for smooth castings.

ject. It is added in full herewith and without comment:

A remark was made during the last convention of the American Foundrymen's Association to the effect that we had enough of poor molders. If poor molders means the specialist who only knows how to make a certain class of castings the advertisements appearing everywhere for this class of mechanics would tend to show that we do not have enough of "poor" mechanics.

There is something absurd in calling a molder a poor mechanic because he can only do one class of work. The Polack who can put up twenty-five car wheels a day is a much better mechanic on car wheels than the first-class jobbing molder who can only put up ten. The semi-molder laborer or handy man, call him what you will, who can turn out more ingot-molds than the highly priced and much sought loam molder, is a better man in this line. The farm hand who in six months' time learns the trick of slapping up a hundred and fifty bench molds a day where the average molder will only put up seventy-five, is the man of the hour in the light work shop, and no windy resolutions about technical education and mastering the molders' trade will displace him.

This is the age of the man who can do one thing well rather

than a whole lot of things indifferently. The man who can turn

The way to learn the foundry business is to go to work in a foundry. Too many think they acquire a practical knowledge of the foundry by sitting in the office and answering telephone calls. Others try to pick it up at college where they melt lead and avoid the danger of spilling any iron in their shoes. But the men who are running our foundries today, will be tomorrow and a hundred years from now, are men who have learned their business in a real foundry. Meanwhile as long as we are going to be connected with a foundry, let us stay on earth. Let us not take wings and attempt to find the ideal, for then we shall be outside of a foundry which is making castings to sell.

Mr. L. C. Jewett adds to the discussion in the October *Foundry:*

There is no doubt of the scarcity of skilled workmen. It was ever thus, and no doubt it will continue to be so, as the demand for skill will always keep in advance of the supply.

It is one of nature's inexorable laws. The value of gold is due to its rarity. The skilled molder is an artist, and is as rare as a skilled portrait painter, sculptor or a musician. With these, as with all artisans, there are some of mediocre qualities. These are botches as Mr. Shaffer terms it. It is a pity this is true, but people will continue to mistake their calling. The botch in the foundry might be a howling success at some other calling for which his talents are fitted.

Once upon assuming charge of a foundry, I discovered two youngsters therein who were rated as apprentices. Always having an interest in any one who is trying to learn, I kept pretty close watch of these two, and soon learned that neither were adapted to the foundry business. As soon as I felt sure that there was nothing to build upon, it occurred to me that it was my duty to undeceive these two young men.

One day I took the lads into my confidence, and, as kindly as possible, explained to them what were the requisites necessary to become a good molder. I pointed out to them where they fell short, and that it did not follow at all that they would fail at some other trade. They were requested to take a couple of weeks off, hold a heart to heart talk with their parents, and to try to get in-

to something more in accord with their talents, if talents they had any.

In two weeks they returned and said they wanted to serve their time out. As they had then put in nearly two years I felt it was hard to have them lose all this. Everything was done in providing them with opportunities. Instructions galore were given them, but all to no purpose.

They were good boys, as the term goes, and sometimes I thought they were too blamed good. I would have been pleased to have seen them break something, but no, they could not catch on to the mental side of molding—the thinkable side. They finally found a level driving dump carts.

There are two distinct sides to the art of molding: the mental and the muscular. To produce the skilled artist, these two characteristics must be present in just the right proportions. Of course it is rare to find this happy combination among those who gravitate to a foundry.

The cold, frigid fact is that there is nothing about the foundry to attract the youth of brains toward it. Brains will easily find a better market and better surroundings than the foundry offers with its varying temperatures and smoky interior, clumsy tools, etc.

I do not think as much depends upon the opportunities offered in the shop to mold different classes of work as it is customary to ascribe thereto. The best and surest heavy machinery, green sand molder I ever saw started as a buck in a stove plate foundry and never served an apprenticeship. I have taken men right off snap flash and bench work and put them on heavy crane work and there was no mistake made. There are those who can absorb knowledge up to a certain point and more cannot be forced into them. Some do not want to know any more, or, as a friend of mine once said, "They don't know anything, and they are d—n glad of it."

I once had an experience with a lot of molders that convinced me that those really skilled in the art will ever be brilliant stars. The meetings of the union had become humdrum affairs. Interest was certainly on the wane and the attendance was falling off. I asked the members present at the meeting how many could on the morrow take off a heat successfully from their cu-

polas. No answers. How many understood or could run a cupola. No answers. I then proposed, if agreeable, reading three papers before the union, describing the latest practice of running a cupola. Upon putting the question it received an arousing aye. Returning home I felt reason for self-congratulation. I had found a means at last to edify the members and revive their waning interests. Here is what the unions could do. They could exchange ideas with one another to the advantage of all.

The reading of the first paper was not half through when the audience began leaving the meeting. At the conclusion—it occupied about a half hour—there were but ten of us left out of thirty-five. At the reading of the second paper every member but the officers withdrew before it was finished. There was not a question asked, a remark or criticism made. The third paper was never read, and no one was interested enough to ask why. They did not care to know why it was omitted. Their brain capacity was filled, what gray matter they had was absorbed in base ball, politics, or something of that kind.

Once in a long while the making of a molder wanders into a foundry. "Mr. Foreman, is there a chance for an apprentice in this shop?" Turning around there stood a bright-eyed young fellow, neatly dressed, with a confident air. "Have you ever been in a foundry from time of commenceing until the close of a day, so that you could form an idea as to what a molder's work is?" I asked him. He had not, so I asked him to come down the next morning when he could see a foundry from start to finish. I advised him to study the matter for a few days, talk it over with his parents, and if, at the end of the week, he still thought this was the business he desired to enter and one in which he would take pride, to come back and we would do our best for him.

That young man has now been a successful foundry foreman for more than six years. He was not tutored much, but was always ahead and alert. He was given every opportunity of course, as all apprentices should have, but really he was not given as much attention as is sometimes advocated for apprentices, and there was no undue enlargement of his cranium, either. He certainly was a star.

DISCUSSION ON THE GRADING OF PIG IRON
(CONTINUED)

In *The Foundry* for September, Mr. W. J. Keep writes as follows:

The discussion of this subject by Mr. Alfred Ladd Colby, chemist of the Bethlehem Steel Co., made one of the most interesting and valuable papers presented before the Buffalo convention of the American Foundrymen's Association. He described an experiment which is full of interest to the founder. Half of a blast furnace cast was run in sand molds and the other half in the iron molds of their casting machine. The former made very open grained dark-colored pigs, while the latter pigs were of a lighter color, with a very close grain, but with absolutely no chill on the sides of the pig that lay against the iron mold. The analysis of each kind of pig shows that the sudden cooling in iron molds left .92 per cent of the carbon in the combined state while the sand pig contained only .25 per cent.

Mr. Colby took a portion of sand cast pigs and a portion of the pigs cast in iron molds and remelted each in a cupola under similar conditions and cast ingots 3½ inches square, half in horizontal and half in vertical sand molds. The chemical composition was the same for each and all had the same grain. The casting being smaller than the sand cast pig, the grain was closer and the casting stronger. Though the ingot was smaller than the pig cast in iron molds, yet casting it in sand molds produces a coarser grain, but the same grain as the ingot from the sand cast pig. Mr. Colby claimed that because combined carbon was the only variable element it accounted for the increased strength of the pig cast in the iron mold.

In 1894 I proved by a large number of tests for the testing committee of the American Society of Mechanical Engineers that strength depended more largely upon the character of grain than on the chemical composition. It was the uniform close grain that gave 41,000 lbs. strength, and the very open grain that gave 15,000 lbs. The last column has the same, .25 per cent. combined carbon, but the 3½ inches sq. ingot had a closer grain than the sand cast pig, and had 17,000 lbs. strength. Combined carbon causes iron to be brittle and therefore weaker. If the same close grain could have been produced without increasing

the combined carbon the strength would have been more than 45,000 lbs.

The table shows several other interesting things. By re-melting the sulphur has nearly doubled and yet the quality does not seem to have been injured.

Ten per cent. of the manganese has escaped.

Very little silicon or carbon was lost.

Chemical Analysis of Each.	Bethlehem Steel Co. Pig Iron Cast in	
	Sand Molds	Iron Molds
Total Carbon	3.46	3.38
Graphitic Carbon	2.93	2.46
Combined Carbon	.47	.92
Silicon	2.93	2.99
Phosphorus	.77	.77
Sulphur	.07	.04
Manganese	.84	.95
Tensile Strength, lbs. per square inch	Very coarse grain 15.000	Very close grain 41.000

Chemical Analysis of Each.	Ingots 3.5 in Square Cast from			
	Pig Cast in Sand		Pig Cast in Iron	
	Cast Horizontally	Cast Vertically	Cast Horizontaliy	Cast Vertically
Total Carbon	3.40	3.09	3.36	3.36
Graphitic Carbon	2.93	3.02	3.36	3.10
Combined Carbon	.47	.37	34	.26
Silicon	2 93	2.91	2.96	2.95
Phosphorus	.77	.77	.77	.76
Sulphur	.07	.06	.08	.07
Manganese	.84	.85	.84	.84
	Each has the same medium grain			
Tensile Strength,	18.000	16.300	17,000	17,000

The ingots cast vertically were no stronger than those cast horizontally.

The experiment shows that a pig iron cast in iron molds

with a very close grain and high combined carbon and the same iron cast in a sand pig mold with open grain and low combined carbon will each when remelted in a cupola make castings exactly alike.

Mr. Colby is in error, however, when he intimates that a close grained iron from one furnace and a coarse grained iron from another furnace both cast in sand molds and both having the same chemical composition will make castings of the same physical quality.

The difference in grain shows that the two furnaces were working under different conditions.

At present it would not be safe to let a furnace deliver any kind of a grained iron because its silicon or sulphur were as specified.

It is absolutely necessary that the founder knows the percentage of silicon that the iron he uses contains, but as the matter now stands it is not quite safe to ignore the fracture altogether.

One of the strongest arguments in favor of machine cast pig iron is that its fracture shows its quality. If like Mr. Colby's pig iron it shows no chill at the surface of the pig, it has no chilling tendency and has quite high silicon. If it shows a deep chill it will not make good ordinary casting even if its silicon is as high as in the pig without chill, but there seems no hope that the introduction of casting machines will insure uniform casting conditions.

Each patented casting machine works under different conditions and there is much more variation in local conditions than in sand casting. As in sand cast pig we must consider fracture and chemical composition, and must then make certain by a trial of the iron, that it will make the castings we want. Testing a test bar will tell whether the iron is suited to a given purpose.

Regarding the adoption of new grade numbers for pig iron, it would seem best to retain the numbers that founders are familiar with and define the percentage and variation of silicon and sulphur that will be allowed for each number, and I would specify that for sand cast No. 1 the grain should be dark, open and uniform, and closer and less uniform for each higher number.

The real use of grade numbers is to establish a price. The

analysis accompanying each car shows the founder how to use the iron.

Mr. A. L. Colby answers in *The Foundry* for October:

In Mr. Keep's criticism of my remarks at the Buffalo Convention of the American Foundrymen's Association, he states on page 5 of your September issue:

"Mr. Colby is in error, however, when he intimates that a close grained iron from one furnace and a coarse grained iron from another furnace both cast in sand molds and both having the same chemical composition will make castings of the same physical quality.

"The difference in grain shows that the two furnaces were working under different conditions.

"At present it would not be safe to let a furnace deliver any kind of a grained iron because its silicon or sulphur were as specified.

"It is absolutely necessary that the founder knows the percentage of silicon that the iron he uses contains, but as the matter now stands it is not quite safe to ignore the fracture altogether."

In answer to my inquiry Mr. Keep writes me that in his first paragraph, quoted above, he refers to my statement, as follows (note the italics).

"This carefully conducted experiment proves beyond doubt that in two lots of pig iron, similar in chemical composition, *including total carbon*, that the proportion of the total carbon present in the combined state in each lot of pig iron, exercises no influence whatever on the properties of castings made from the two pig irons after remelting."

Mr. Keep has failed to notice that I specify that the *total carbon*, as well as the other constituents, must be alike. Under these conditions of *entire* similarity in the chemical composition, I was not in error in stating that the close or open grained fracture of the two irons will have no influence on the physical qualities of the castings made therefrom.

Those whose experience in applying chemistry to the foundry indicates otherwise have been misled either by inaccurate chemical work, or unrepresentative sampling; or else have based

their conclusions on partial analyses or insufficient data.

I made no statement intimating that "it would be unsafe to let a furnace deliver any kind of a grained iron because its silicon or sulphur were as specified" (however, sand-cast pigs of dissimilar appearance often have identical composition), nor did I intimate that a foundry iron made when the furnace was working badly (and hence usually deficient in total carbon) would make as satisfactory a casting as an iron of similar silicon and sulphur contents made under normal furnace conditions.

The foundryman who specifies certain silicon and sulphur, and an open grained fracture, has made a decided advance over the man who still purchases iron entirely by grade. Both often pay an unnecessary bonus for the appearance or reputation of the iron, and both would get more uniformly successful castings at a less cost by obtaining a full analysis of their good castings, and then buying entirely on chemical specifications, the cheapest irons obtainable on the market, which when mixed and melted, give the chemical composition desired.

At equal prices the foundryman will effect a further saving by giving preference to a machine cast iron of the chemistry specified, rather than a sand cast iron.

In *The Foundry* for November, Mr. Keep continues the discussion:

Chemists often endeavor to make founders think that iron which contains the desired percentages of silicon and sulphur will make as desirable castings, whether the pig iron has a close and uneven grain or a uniform open grain.

I do not think that it is safe at present to allow a furnaceman to deliver any close-grained iron that they choose, even if it has the desired silicon and sulphur, because a close uneven grain indicates that the furnace was not working well.

Mr. Colby says: "Nor did I intimate that a foundry iron made when the furnace was working badly, (and hence usually deficient in total carbon) would make as satisfactory a casting as an iron, of similar silicon and sulphur contents, made under normal furnace conditions."

This is my contention, and I say that the reason that the furnaceman is so anxious to have a founder specify the silicon and sulphur, and let the grain be ever so close and uneven, is for

the purpose of allowing them to get rid of the large quantities of iron that they make when the furnace is working badly.

Mr. Colby says: "The foundryman who specifies certain silicon and sulphur and an open-grained fracture has made a decided advance over the man who still purchases iron entirely by grade."

We are purchasing pig iron by exactly that method, but the furnace is very anxious to have us purchase either by silicon and sulphur, or by grain, but not by both.

Continuing the above question, "both would get more uniformly successful castings at a less cost by obtaining a full analysis of their good castings and then buying entirely on chemical specifications, the cheapest irons obtainable on the market, which, when mixed and melted, give the chemical composition desired."

In another paragraph Mr. Colby states "that total carbon, as well as other constituents, must be alike." "Under these conditions of entire similarity in chemical composition the close or open grained fracture of the two irons will have no influence on the physical qualities of the castings made therefrom." I know from experience that even this is not always the case.

But is it not a fact that very few furnaces would be willing or able to furnish cheap irons with a full chemical anaylsis that would meet a specification?

This would be more difficult than to furnish pig iron with silicon and sulphur within specified limits and with a uniform open grain.

All this discussion relates to sand-cast pig iron, such as nearly all founders must use. If the furnaces will give us pigs cast in iron molds, with a 4″x4″ cross section, delivered in half pigs 24 inches long, each having a notch on the underside, so that we can break them without trouble, (and cast the brand on each section) with no sign of chill in the edges of the fracture, we will not object to a close grain. I am in favor of such machine-cast pigs.

DISCUSSION ON MR. R. C. CUNNINGHAM'S PAPER ON "FOUNDRY COSTS."

The Foundry, October. A Brooklyn patternmaker contributes to this discussion:

Mr. Cunningham holds up the foundrymen's end in a very interesting manner, he does not lose any opportunity to call the patternmaker down for his slipshod and unmechanical work; in fact, he throws the whole blame at his head for all the unnecessary work and consequent high cost of castings.

Now I cordially disagree with Mr. Cunningham in this contention, particularly when he claims that, nine times out of ten the requirements of the foundry are not considered by the patternmaker of sufficient importance to consult the foundry foreman as to the cheapest and best method of molding a pattern.

My experience as a patternmaker covers a period verging on to twenty-seven years, and in the last fifteen years I have had dealings with a goodly number of foundry foremen connected with jobbing foundries in this part of the country, and with but one exception it has yet to be my good fortune to meet a foundry foreman who can read a drawing with enough intelligence to make a consultation with the patternmaker profitable alike to both. I do not write this in any unkind spirit, but to state facts as I find them, and it is with pleasure that I can say that most all of these men were good mechanics, but they simply can not read a drawing, although they can tell you all about how a pattern should have been made after they see it in the finished state, and judging by what I hear from other members of my craft who have travelled extensively through this fair land of ours, my experience is not an uncommon one in this respect by any means, but should be a sufficient refutation of the charges brought forward by Mr. Cunningham.

The one exception I refer to was a big brawn Scotchman, a week-old foreman of a nearby foundry, who had been sent for to decide how he wanted a very complicated pattern that he was to mold, made. He came into the shop like a whirlwind, with the remark that he would like to see the blue print for a little while, and after looking at it not more than five minutes, he went into the minutest details as to just how he wanted everything made, in a way that would have convinced any one that he knew what he was talking about. As he was leaving the shop, I asked him what he thought the casting would weigh, and after another glance at the drawing, he said two and a half tons, and was gone like a flash, and with him the high opinion I had formed from his masterful handling of that drawing, for I had inwardly taken a guess at the weight of that casting, which was only a ton shy of his; but this braw lad from the land of Bobbie Burns knew his business, as the casting weighed within a few pounds of his

guess, and my respect for him increased as suddenly as my conceit decreased. I regret to say that this man died young, which is a fault, so I've heard, with all good Scotchmen.

Mr. Cunningham lays particular stress on the poor condition of patterns sent to the foundry, which makes extra work for the molder, and he certainly is right, but I'll ask Mr. Cunningham to tell us who put the patterns "hors de combat." Wasn't it the careless molder with his vent wire that must be jabbed well into the pattern until pitted beyond recognition on the cope side, or was it his rapping bar of generous proportions that is driven deeply with unerring aim and fondness for the exact center of glue joints; scorning the presence of rapping plates as being placed improperly and pounding the dowel pins and holes until the "shake" of the pattern makes it well nigh impossible to make a decent casting? Stop these little practices of your molders and your patterns will live longer.

On the question of firms who expect their foremen to turn out first-class castings with poor and cheap flasks it isn't hard to agree with everything he claims, as it is impossible to do good work with poor tools, and I think we can learn something from our brethren on the "other side" of the herring pond in this matter, as they use metal flasks almost exclusively, it being a rare case indeed when a wooden flask is used, while with us the reverse is the case because of the mistaken idea of cheapness, though I notice a growing tendency of late years in the use of metal flasks—at least in this part of the country—which should become universal, as the life of the wooden flask is very uncertain, usually running into a decrepit and shaky old age prematurely.

Mr. P. R. Ramp answers this in the same journal in the issue for November:

I agree with what Mr. Cunningham says with reference to the impractical manner in which many patterns are constructed, and it is astonishing the number of pattern makers there are who have only a faint conception of the details of the molding trade. I was also very much surprised to learn that only a few Scotch foundry foremen could read drawings. However, I am inclined to think that our Brooklyn pattern maker's experience has been limited. If such was not the case I do not believe he would make the assertion that very few foundry foremen can read drawings. Of course, we are bound to admit that there are botches working at the molder's trade as well as any other trade. But we do not relish the idea that seems to be fixed in the minds of many, that all that is required of a molder is a "strong back and a weak mind." I think that it would be a greater task for the average pattern maker to step into the foundry and make a casting than it would be for the average molder to make the pattern for the